

Vapor Intrusion Risk Pathway: Regulatory Updates

SAM Forum

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EPA-OSWER Draft Guidance

- Tier 1: Primary Screening
 - Q1: VOCs present?
 - Q2: Near buildings? ☐
 - Q3: Immediate concern?
- Tier 2: Secondary Screening
 - Q4: Generic screening
 - Q5: Semi-site specific screening (alphas from charts & tables)
- Tier 3: Site-Specific Pathway Assessment
 - Q6: Indoor air (and/or subslab)

Newest Changes (2010?)

EPA OSWER VI Guidance

- **Tier 1: Primary Screening**
 - Q1: VOCs present?
 - Q2: Near buildings?
 - Q3: Immediate concern?
- **Tier 2: Source Screening**
 - Generic screening using near-source samples
- **Tier 3: Pathway (Building) Assessment**
 - Multiple lines of evidence (sg & gw)
 - Sub-slab & Indoor Air Data

Guidance Updates

- Fed EPA (OSWER & Superfund)
 - Moving to sub-slab & indoor air
 - 7 to 30 day indoor air sampling period
 - Att factor of 0.1 for SG & 0.001 for GW
 - Modeling no longer an exit
- EPA-OUST: Guidance for HCs by 2012
 - Exclusion criteria?

Allowable Benzene in GW

1e-6 risk

- New OSWER Guidance:

$$0.31 \text{ ug/m}^3 / 0.001 = 0.31 \text{ ug/L} / 0.2 = 1.5 \text{ ug/L}$$

- CA-LUFT Exclusion Value: 1000 ug/L

~700 times lower than database suggests!!

Allowable Soil Gas Levels

(Benzene 1e-6 Risk, residential)

State	Alpha	1/Alpha	Risk Based Level (ug/m ³)
EPA Now	0.002	500	155
EPA 2012?	0.1	10	3.1
CHHSL	0.002	500	42
DTSC – J-E	0.0009	1100	95
SD DEH			1,000

CA Agencies

- CA-DTSC (& LA-RWQCB)
 - Soil Gas, VI, & Mitigation “Advisory”
 - Different risk level for residential & commercial
- EPA Region 9
 - Follows the EPA Draft VI Guidance
 - Adopted Region 3 Screening Levels
- SF-RWQCB
 - ESLs include aliphatic HCs
- San Diego DEH
 - Has own model/spreadsheet
 - Uses $1e-6$ risk for both residential & commercial

Proposed DTSC Changes

- Preference for Sub-slab Samples
- Collect Exterior SG Samples At Source
- Repeated Sampling of Soil Gas
- Preference for Gaseous Tracers
- Raising Sub-slab AF to 0.1 (10x stricter)
- Tougher Methods for Naphthalene
- A Decision Matrix??

Uh-Oh

E-mail received on 9/15/09:

I wanted to provide a heads up that R2 (SF) is poised to modify its Environmental Screening Levels (ESLs) with respect to the vapor intrusion pathway ...

the consequence of this change would be much lower groundwater ESLs for this pathway (20 to 30x lower for most VOCs and over 200x lower for biodegradable VOCs such as BTEX) ...

details below ... cheers

From New CA-LUFT

Based on these studies, a LUFT site is assumed to present no unacceptable risk from vapor intrusion if site conditions indicate that there is :

- *Dissolved* groundwater concentrations below 1000 micrograms per liter (ug/L) for benzene and 10,000 ug/L for TPH and 5' from receptor.
- Free product is 30 or more from receptor

Under these conditions, it is assumed that natural attenuation is sufficient to mitigate concentrations

ITRC VI GUIDANCE

- Practical How-to Guide
- Stepwise Approach
- Investigatory Tools (Toolkit)
- Thorough Discussion of Mitigation
- Scenarios Document
- Three Training Dates in 2010

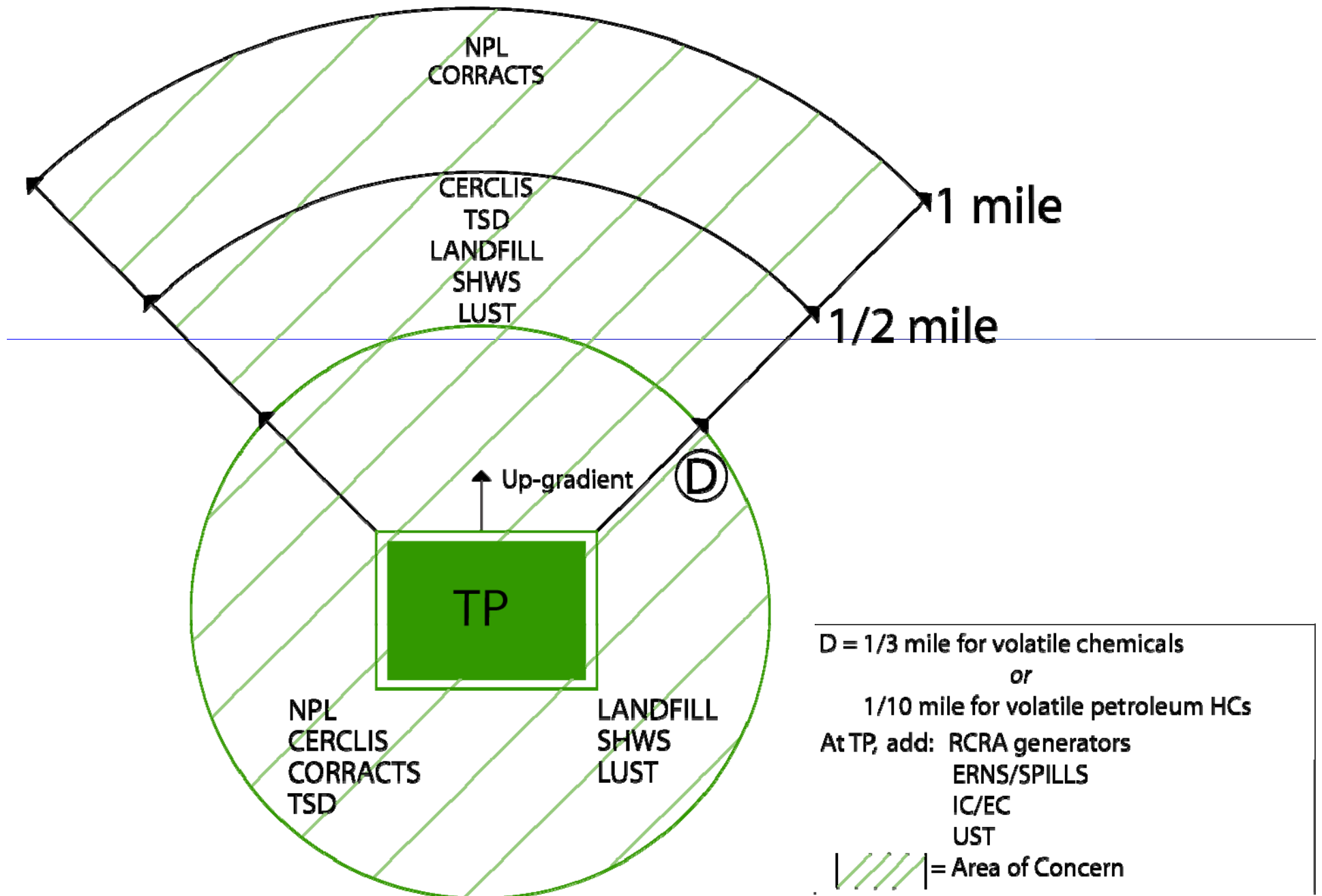
The Net Widens: ASTM VI Standard

- Focus on Property Transactions
- Prescriptive Screening Distances
- No RBSLs (RBC)
- No Assessment Recommendations
- Legal Standards
- Mitigation
- Released March 3, 2008

ASTM VI Standard

*Vapor Intrusion Condition (VIC) is defined as “the presence or likely presence of any volatile chemical of concern in existing or planned structures on a property resulting from an existing release or a past release from contaminated soil or groundwater on the property or within close proximity to the property, **at a concentration that presents or may present a human health risk.**”*

SEARCH DISTANCE TEST



Regulatory Approach for HC Sites

- Current Regulatory Approaches:
 - USEPA: Guidance not recommended for UST sites
 - ASTM: Screening distance reduced from 100' to 30'
 - Some agencies include a 10X biodegradation factor
 - ITRC: Use vertical profile to demonstrate
- Data suggests these approaches are overly conservative for most petroleum release sites

Conceptual Model

What is BioVapor?

1-D Analytic al Model

Version of Johnson & Ettinger vapor intrusion model modified to include aerobic biodegradation (DeVaull, 2007).

Oxygen Mass Balance

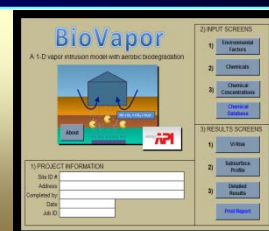
Uses iterative calculation method to account for limited availability of oxygen in vadose zone.

User- Friendly

Simple interface intended to facilitate use by wide range of environmental professionals.

$$\left(\frac{c_e}{c_s}\right) = \frac{\left(\frac{1}{L_{mix} \cdot ER}\right)}{A \cdot \left(\frac{1}{L_{mix} \cdot ER} + \frac{1}{h}\right) + B \cdot \left(\frac{L_a}{D_{eff}}\right)}$$

SIMPLE MATH



KEY POINT:

Free, easy-to-use vapor intrusion model that accounts for oxygen-limited aerobic vapor intrusion.

Want to Know More?

- ITRC 2-day VI Training
 - October 4, 2010: Atlanta
 - January 2011: San Antonio
- AWMA 2-day – Chicago 9/29/2010
- PVI Training – UST Conf: Boston 9/2010
- PVI Workshop – AEHS-MA: Oct 2010
- EPA VI Workshop – AEHS San Diego 3/2011

Existing Documents & Training

- Soil Gas Sampling SOPs
 - Soil Gas Sampling, Sub-slab Sampling, Vapor Monitoring Wells/Implants, Flux Chambers (www.handpmg.com)
- Other
 - ITRC VI Guidance (www.itrcweb.org)
 - API Soil Gas Document (api.org)
 - ASTM E2600-08: Good Summary Table in App X

VI Documents

- Overview of SV Methods (www.handpmg.com)
 - LustLine Part 1 - Active Soil Gas Method, 2002
 - LustLine Part 2 - Flux Chamber Method, 2003
 - LustLine Part 3 - FAQs October, 2004
 - LustLine Part 4 – Soil Gas Updates, Sept 2006
 - LustLine – VI For Petroleum Hydrocarbons, Oct 2010
- Robin Davis' Articles on Bioattenuation:
 - Lustline #61 May 2009
 - LustLine #52 May 2006 (www.neiwpcc.org)

VI Websites & Links

- www.handpmg.com
 - Soil Gas Information
 - Other Site Assessment Methods
- www.itrcweb.org
- www.api.org
- EPA-OSWER's New VI Site:
<http://www.epa.gov/oswer/vaporintrusion/>



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